IN THE CLAIMS

Please amend the claims as follows:

1. (currently amended) A computer implemented method in a simulation of a physical system, wherein the system is described by a first set of simultaneous linear algebraic equations and is simulated by a second system described by a second set of simultaneous linear algebraic equations, each of said equations being of a form:

$$e_{i1}x_1 + e_{i2}x_2 + e_{i3}x_3 + \ldots + e_{in}x_n = b_i$$

wherein x_j are unknowns, e_{ij} are coefficients, and b_i are quantities, said coefficients and quantities being known algebraic expressions, said method comprising the steps of:

a) iteratively eliminating said unknowns from each of said sets of simultaneous linear algebraic equations, ~~until each of said equations are in a form:~~

$$\cancel{(l_{ll})_k x_l = (r_l)_k}$$

~~wherein l_{ll} and r_l are algebraic expressions, and $k=\{1;2\}$ indicate one of said sets that said equation is derived from;~~ wherein certain variables in the coefficients e_{ij} and the quantities b_i of such an equation are raised to a positive integer power u, and step a) includes the following substeps for each of the equations:

a1) arranging those certain variables as u instances of the variables, each instance being raised to a power of 1 and all the instances being multiplied together;

a2) arranging expressions of such an equation resulting from substep a1) in a form <unitaryoperator><operand><operator><operand> .....<operator><operand>, where the unitary operator is either + or -, and each operator is one of +, -, or *, including inserted a unitary operator in front of the expression if an expression does not already commence the unitary operator;

a3) removing brackets of expressions of such an equation resulting from substep a2), by performing operations to render brackets superfluous, including multiplying terms inside and outside brackets, and discarding resulting superfluous brackets;

a4) substituting operators of expressions of such an equation resulting from substep a3), wherein the substituting of the operators substitutes all + operators with a string +1* and all - operators with a string -1*;

a5) converting numerical terms of expressions of such an equation resulting from substep a4) into an exponential format .[unsigned number]e[e-sign][unsigned exponent], wherein e[e-sign][unsigned exponent] for a numerical term represents a quantity 10 raised to a power [e-sign][unsigned exponent] multiplied by a number represented by .[unsigned number], such that .[unsigned number]e[e-sign][unsigned exponent] equals the numerical term, [unsigned number] being an n-digited number comprising only digits, n being a prefixed integer greater than 0, [e-sign] being a sign of the exponent, [unsigned exponent] being an m-digited number, m being a prefixed integer greater than 0;

a6) sorting operands of terms in expressions of such an equation resulting from substep a5), wherein the sorting of the operands arranges the operands into ascending order according to a certain standardized value sequence;

a7) combining terms of expressions of such an equation resulting from substep a6) having matching variable-groups, wherein the combining of the terms includes combining the matching variable-group terms into a single term; and

a8) rearranging terms of expressions of such an equation resulting from substep a7), wherein the rearranging of the terms arranges the terms into an ascending order according to values of their respective variable-groups, wherein substeps a1) through a8) reducing such an equation to a form:

$(l_{ii})_k\, x_i = (r_i)_k$

wherein l_{ii} and r_i are algebraic expressions, and $k=\{1;2\}$ indicate one of said sets that said equation is derived from; and

b) comparing, for each of said unknowns, a first product $(l_{ii})_1 * (r_i)_2$ and a second product $(l_{ii})_2 * (r_i)_1$, wherein the first product is an algebraic expression and the second product is an algebraic expression, and wherein if said products match for all said unknowns said second set of simultaneous linear algebraic equations is equivalent to the first set of simultaneous linear algebraic equations; and thereby is determined to be a proper representation of the physical system, wherein the eliminating said unknowns in step a) enables the comparing in step b) to determine if the products match without determining numerical values for the unknowns and without performing a matrix inversion.

2. (currently amended) The computer implemented method according to claim 1, said method further including the initial steps of:

recasting said algebraic expressions into a form of one or more token pairs arranged sequentially in a string, each said token pair comprising an operator followed by an operand.~~; and~~

~~reducing said strings in accordance with a set of predetermined simplifying rules to obtain reduced expressions; and~~

wherein ~~said eliminating~~ step a) reduces the strings to the form $(l_{ii})_k\, x_i = (r_i)_k$ ~~is performed on said reduced strings~~ in accordance with a set of predetermined operations.

3. (currently amended) The method according to claim 2, wherein the reducing of the strings to the form $(l_{ii})_k\, x_i = (r_i)_k$ ~~said simplifying rules~~ comprises ~~performing~~ the steps of:

arranging the token pairs into subgroups.~~;~~

~~arranging the operand tokens in such a subgroup in a certain order, thereby producing ordered operands;~~

~~reducing the ordered operands by consolidating one or more constants and eliminating variables of opposite effect to form reduced subgroups; and~~

~~consolidating one or more multiple instances of similar subgroups, to produce a reduced string~~.

4. (currently amended) A computational apparatus for use in simulating a physical system, wherein the system is described by a first set of simultaneous linear algebraic equations and is simulated by a second system described by a second set of simultaneous linear algebraic equations, each of said equations being of a ~~in the~~ form:

$$e_{i1}x_1 + e_{i2}x_2 + e_{i3}x_3 + \ldots + e_{in}x_n = b_i$$

wherein x_j are unknowns, e_{ij} are coefficients, and b_i are quantities, said coefficients and quantities being known algebraic expressions, said apparatus comprising:

eliminating means for iteratively eliminating said unknowns from each of said sets of simultaneous linear algebraic equations.~~, until each of said equations are in a form:~~

$$\cancel{(l_{ii})_k\, x_i = (r_i)_k}$$

~~wherein l_{ii} and r_i are algebraic expressions, and $k=\{1;2\}$ indicate one of said sets that said equation is derived from;~~ wherein certain variables in the coefficients e_{ij} and the quantities b_i of such an equation are raised to a positive integer power u, and the eliminating means includes:

a1) first arranging means for arranging those certain variables as u instances of the variables, each instance being raised to a power of 1 and all the instances being multiplied together;

a2) second arranging means for arranging expressions of such an equation from the first arrangement means in a form <unitaryoperator><operand><operator><operand> .....<operator><operand>, where the unitary operator is either + or -, and each operator is one of +, -, or *, including inserted a unitary operator in front of the expression if an expression does not already commence the unitary operator;

a3) removing means for removing brackets of expressions of such an equation from the second arranging means, by performing operations to render brackets superfluous, including multiplying terms inside and outside brackets, and discarding resulting superfluous brackets;

a4) substituting means for substituting operators of expressions of such an equation from the removing means, wherein the substituting of the operators substitutes all + operators with a string +1* and all - operators with a string -1*;

a5) converting means for converting numerical terms of expressions of such an equation from the substituting means into an exponential format .[unsigned number]e[e-sign][unsigned exponent], wherein e[e-sign][unsigned exponent] for a numerical term represents a quantity 10 raised to a power [e-sign][unsigned exponent] multiplied by a number represented by .[unsigned number], such that .[unsigned number]e[e-sign][unsigned exponent] equals the numerical term, [unsigned number] being an n-digited number comprising only digits, n being a prefixed integer greater than 0, [e-sign] being a sign of the exponent, [unsigned exponent] being an m-digited number, m being a prefixed integer greater than 0;

a6) sorting means for sorting operands of terms in expressions of such an equation from the converting means, wherein the sorting of the operands arranges the operands into ascending order according to a certain standardized value sequence;

a7) combining means for combining terms of expressions of such an equation from the sorting means having matching variable-groups, wherein the combining of the terms includes combining the matching variable-group terms into a single term; and

a8) third rearranging means for rearranging terms of expressions of such an equation from the combining means, wherein the rearranging of the terms arranges the terms into an ascending order according to values of their respective variable-groups, wherein substeps a1) through a8) reduce such an equation to a form:

$(l_{ii})_k\, x_i = (r_i)_k$

wherein l_{ii} and r_i are algebraic expressions and not solely numerical values, and $k=\{1;2\}$ indicate one of said sets that said equation is derived from;

and

comparing means for comparing, for each of said unknowns, a first product $(l_{ii})_1 * (r_i)_2$ and a second product $(l_{ii})_2 * (r_i)_1$, wherein the first product is an algebraic expression and the second product is an algebraic expression, and wherein if said products match for all said unknowns said second set of simultaneous linear algebraic equations is equivalent equivalent to the first set of simultaneous linear algebraic equations~~,~~ and thereby is a proper representation of the physical system, wherein the eliminating said unknowns by the eliminating means enables the comparing means to determine if the products match without determining numerical values for the unknowns and without performing a matrix inversion.

5. (currently amended) The computational apparatus according to claim 4, said apparatus further including:

means for recasting said algebraic expressions into a form of one or more token pairs arranged sequentially in a string, each said token pair comprising an operator followed by an operand.~~; and~~

~~means for reducing said strings in accordance with a set of predetermined simplifying rules to obtain reduced expressions; and~~

wherein said eliminating means ~~for eliminating operates on said reduced strings~~ reduces the strings to the form $(l_{ii})_k\, x_i = (r_i)_k$ in accordance with a set of predetermined operations.

6. (currently amended) The apparatus according to claim 5, wherein the reducing of the strings to the form $(l_{ij})_k\ x_i = (r_i)_k$ comprises~~said eliminating means performs the predetermined operations of~~:

arranging the token pairs into subgroups.~~;~~

~~arranging the operand tokens in such a subgroup in a certain order, thereby producing ordered operands;~~

~~reducing the ordered operands by consolidating one or more constants and eliminating variables of opposite effect to form reduced subgroups; and~~

~~consolidating one or more multiple instances of similar subgroups, to produce a reduced string.~~

7. (currently amended) A computer program product carried by a storage medium, the computer program product being for use in a simulation of a physical system, wherein the system is described by a first set of simultaneous linear algebraic equations and is simulated by a second system described by a second set of simultaneous linear algebraic equations, each of said equations being of a form:

$$e_{i1}x_1 + e_{i2}x_2 + e_{i3}x_3 + \ldots + e_{in}x_n = b_i$$

wherein x_j are unknowns, e_{ij} are coefficients, and b_i are quantities, said coefficients and quantities being known algebraic expressions, said computer program product comprising:

an eliminating program element for iteratively eliminating said unknowns from each of said sets of simultaneous linear algebraic equations, ~~until each of said equations are in a form:~~

$$\cancel{(l_{ii})_k\ x_i = (r_i)_k}$$

~~wherein l_{ii} and r_i are algebraic expressions, and $k = \{1;2\}$ indicate one of said sets that said equation is derived from;~~wherein certain variables in the coefficients e_{ij} and the quantities b_i of such an equation are raised to a positive integer power u, and the eliminating program element includes the following program subelements:

a1) first arranging program subelement for arranging those certain variables as u instances of the variables, each instance being raised to a power of 1 and all the instances being multiplied together;

a2) second arranging program subelement for arranging expressions of such an equation from first arranging program subelement in a form <unitaryoperator><operand><operator><operand> .....<operator><operand>, where the unitary operator is either + or -, and each operator is one of +, -, or *, including inserted a unitary operator in front of the expression if an expression does not already commence the unitary operator;

a3) removing program subelement for removing brackets of expressions of such an equation from the second arranging program subelement, by performing operations to render brackets superfluous, including multiplying terms inside and outside brackets, and discarding resulting superfluous brackets;

a4) substituting program subelement for substituting operators of expressions of such an equation from the removing program subelement wherein the substituting of the operators substitutes all + operators with a string +1* and all - operators with a string -1*;

a5) converting program subelement for converting numerical terms of expressions of such an equation from the substituting program subelement into an exponential format .[unsigned number]e[e-sign][unsigned exponent], wherein e[e-sign][unsigned exponent] for a numerical term represents a quantity 10 raised to a power [e-sign][unsigned exponent] multiplied by a number represented by .[unsigned number], such that .[unsigned number]e[e-sign][unsigned exponent] equals the numerical term, [unsigned number] being an n-digited number comprising only digits, n being a prefixed integer greater than 0, [e-sign] being a sign of the exponent, [unsigned exponent] being an m-digited number, m being a prefixed integer greater than 0;

a6) sorting program subelement for sorting operands of terms in expressions of such an equation from the converting program subelement, wherein the sorting of the operands arranges the operands into ascending order according to a certain standardized value sequence;

a7) combining program subelement for combining terms of expressions of such an equation from the sorting program subelement having matching variable-groups, wherein the combining of the terms includes combining the matching variable-group terms into a single term; and

a8) third rearranging program subelement for rearranging terms of expressions of such an equation from the combining program subelement, wherein the rearranging of the terms arranges the terms into an ascending order according to values of their respective variable-groups, wherein substeps a1) through a8) reduce such an equation to a form:

$(l_{ii})_k\, x_i = (r_i)_k$

wherein l_{ii} and r_i are algebraic expressions and not solely numerical values, and $k=\{1;2\}$ indicate one of said sets that said equation is derived from;

and

a comparing program element for comparing, for each of said unknowns, a first product $(l_{ii})_1 * (r_i)_2$ and a second product $(l_{ii})_2 * (r_i)_1$, wherein the first product is an algebraic expression and the second product is an algebraic expression, and wherein if said products match for all said unknowns said second set of simultaneous linear algebraic equations is equivalent to the first set of simultaneous linear algebraic equations, and thereby is a proper representation of the physical system, wherein the eliminating said unknowns by the eliminating program element enables the comparing by the comparing program element to determine if the products match without determining numerical values for the unknowns and without performing a matrix inversion.

8. (currently amended) The computer program of claim 7 further comprising:

a program element for recasting said algebraic expressions into a form of one or more token pairs arranged sequentially in a string, each said token pair comprising an operator followed by an operand~~; and~~

~~a program element for reducing said strings in accordance with a set of predetermined simplifying rules to obtain reduced expressions; and~~

wherein said eliminating program element ~~for eliminating operates on said reduced strings~~ reduces the strings to the form $(l_{ii})_k\, x_i = (r_i)_k$ in accordance with a set of predetermined operations.

9. (currently amended) The computer program of claim 8 wherein ~~said program element for eliminating performs the predetermined operations of~~ the reducing of the strings to the form $(l_{ii})_k\, x_i = (r_i)_k$ comprises:

arranging the token pairs into subgroups.~~;~~

~~arranging the operand tokens in such a subgroup in a certain order, thereby producing ordered operands;~~

~~reducing the ordered operands by consolidating one or more constants and eliminating variables of opposite effect to form reduced subgroups; and~~

~~consolidating one or more multiple instances of similar subgroups, to produce a reduced string.~~

10 - 14. (canceled)